

- 09/787932


IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**CERTIFICATE OF EXPRESS MAILING**

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Attorney Docket No.: SIP1P045

First Named Inventor:

Noboru SEGAWA



Melinda Rodriguez

TRANSMITTAL LETTER FOR A PCT INTERNATIONAL APPLICATION ENTERING THE NATIONAL STAGE IN THE U.S. AS A DESIGNATED or ELECTED OFFICE UNDER 35 USC 371

Commissioner for Patents
Box PCT
Attention: DO/EO
Washington, DC 20231

Transmitted herewith are the papers required to enter the national stage in the U.S. as a designated office/elected office for the following PCT international patent application:

INTERNATIONAL APPLICATION NUMBER: PCT/JP00/04926**Int'l Filing Date: July 24, 2000****1st Priority Date: July 23, 1999****Inventor(s): Noboru SEGAWA****For: MOTOR**

The United States Patent Office is: (select one)

- ☒ A Designated Office (No Demand was filed - See 37 CFR 1.494)
☐ An Elected Office (A Demand for Preliminary Examination was Filed - See 37 CFR 1.495)

Enclosures:

- ☐ A copy of the international application (if this line is not checked, the international application was previously communicated by the International Bureau or the international application was originally filed in the USPTO).
☒ An English Translation of the International Application
☒ A Combined Declaration and Power of Attorney
☐ A copy of amendments made under PCT Article 19
☐ A translation of amendments made under PCT Article 19
☐ A translation of amendments made under PCT Article 34 (annexes to the international preliminary examination report)
☐ Information Disclosure Statement

- ☒ An Assignment of the Invention to: NIDEC COPAL CORPORATION.
(with \$40.00 recordal fee)
- ☐ A Preliminary Amendment
- ☒ A copy of the International Search Report
- ☐ A copy of the Preliminary Examination Report

Fee Calculation:

<input type="checkbox"/>	Applicant is entitled to Small Entity Status under 37 C.F.R. §1.27.	
<input checked="" type="checkbox"/>	BASIC FEE	\$860.00
	(IPEA-U.S. \$690/345; ISA-U.S. \$710/355; PTO not ISA or IPEA \$1000/500; U.S. IPEA all claims meet 33(2)-(4) \$100/50; File w/ EPO or JPO search report \$860/430;)	
<input type="checkbox"/>	Surcharge for filing a late oath or declaration (\$130/65)	\$
<input type="checkbox"/>	Surcharge for filing a late translation (\$130)	\$
<input checked="" type="checkbox"/>	Assignment recordal fee (\$40)	\$40.00
<input type="checkbox"/>	Multiple dependent claims (\$270/135)	\$
<input type="checkbox"/>	Excess claims - see calculation below	\$
	Total Claims: - 20 = 0	X \$18/9 claim = \$
	Independent Claims: - 3 = 0	X \$80/40 ind. claim = \$
		Excess Claim Total \$
	TOTAL FEES	\$900.00

☒ Check No. 10673 in the amount of \$900.00 is enclosed cover the filing fees (including the basic national fee under 37 CFR 1.492(a)) as calculated above.

☒ The Commissioner is authorized to charge any fees beyond the amount enclosed which may be required, or to credit any overpayment, to Deposit Account No. 500388 (Order No. SIP1P045).

General Authorization for Petition for Extension of Time (37 CFR §1.136)

☒ Applicants hereby make and generally authorize any Petitions for Extensions of Time as may be needed for any subsequent filings. The Commissioner is also authorized to charge any extension fees under 37 CFR §1.17 as may be needed to Deposit Account No. 500388 (Order No. SIP1P045).

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Date: March 21, 2001

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09/787932

JC03/Rec'd PCT/PTO 21 MAR 2001

VERIFICATION

The undersigned, of the below address, hereby certifies that he/she well knows both the English and Japanese languages, and that the attached is an accurate English translation of the PCT application filed on July 24, 2000 under No. PCT/JP00/04926.

The undersigned declares further that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 19th day of March, 2001.

Signature:



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09/787932

DESCRIPTIONMotor**Technical Field**

5 The present invention relates to a motor; and, in particular, to a small-size motor which is built into a portable communications instrument (e.g., cellular phone) and is utilized as a source for generating vibrations for calling functions.

Background Art

10 Conventionally known as techniques in such a field are those disclosed in Japanese Utility Model Publication No. SHO 62-23248 and Japanese Patent Application Laid-Open No. HEI 11-136901. The former publication proposes a technique in which, while a motor contact for supplying current to
15 a motor brush has a flexibility, its elastic repulsive force is actively utilized. On the other hand, a small-size motor 100 disclosed in the latter publication is made such that it is easily assembled into communications instruments such as a cellular phone. As shown in Fig. 6, the small-size motor
20 100 has an output shaft 103 to which a weight 104 is secured, whereas a forwardly extending electric terminal 102 is fixed at a barrel 100a of the small-size motor 100 by way of a bracket 105 and a holder 109. If such an electric terminal 102 made of a spring sheet is utilized, then no soldering
25 is necessary when securing the motor 100 onto a circuit board 101, whereby the efficiency of production improves.

Disclosure of the Invention

However, the above-mentioned conventional motors have a problem as follows. Namely, since the electric terminal 102 obliquely extends forward, the front end of the terminal 102 is grounded on the circuit board 101, whereby the motor 100 would be placed on the circuit board 101 in an unstable state in terms of its weight balance. In cases where the motor is built into other instruments such as a cellular phone in particular, it is necessary for a lid of the cellular phone or the like to press the motor 100 from thereabove. If its assembling operation is carried out in the unstable state shown in Fig. 6, however, then the motor 100 may move leftward in the drawing due to the pressure from the upper side (see the depicted arrow), whereby the terminal 102 may be detached from its predetermined electric contact 101a on the circuit board 101. That is, the motor 100 has a problem that it is not easily assembled into other instruments.

In order to overcome the above-mentioned problem, it is an object of the present invention to provide a motor which can stably be mounted on a circuit board when being assembled into an instrument in particular.

The motor in accordance with the present invention comprises a motor body, an output shaft projecting from a front end of the motor body, and a voltage-supplying terminal provided in the motor body, the terminal having an elastic force in a direction substantially orthogonal to the output

shaft and also having a grounding portion disposed near a rear end of the motor body.

At the time of assembling a motor, the present invention intends to place the motor on a circuit board such that the grounding portion of its terminal comes into electric contact with a predetermined position on the circuit board. Namely, since the terminal has an elastic force, it is necessary for the motor to be stable on the circuit board when placed thereon. In the motor in accordance with the present invention, the grounding portion of the terminal is disposed near the rear end of the motor body so as to face the output shaft, whereby the motor attains a supporting balance on the circuit board, thus improving its stability. Also, from the viewpoint of keeping the rotational balance of the output shaft itself, which rotates at a high speed in front of the motor, it is quite meaningful to dispose the grounding portion of the terminal near the rear end of the motor body.

Preferably, in the above-mentioned motor, the terminal is formed by bending an elastic material and comprises a first portion extending substantially parallel to the output shaft from the motor body; a second portion extending substantially parallel to the first portion from a front end of the first portion by way of a bent part; and a third portion, formed with the grounding portion, projecting outward in a curved manner from a rear end of the second portion. When such a configuration is employed, the terminal

can be formed with a simple structure at a low cost, whereby its cost of manufacture can be cut down.

Preferably, the above-mentioned motor further comprises a weight eccentrically secured to the output shaft. When such a configuration is employed, a vibrating motor can be constructed appropriately, whereby it becomes easier to assemble the motor into communications instruments such as a cellular phone.

The present invention will be more fully understood from the detailed description given hereinbelow and the accompanying drawings, which are given by way of illustration only and are not to be considered as limiting the present invention.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will be apparent to those skilled in the art from this detailed description.

Brief Description of the Drawings

Fig. 1 is a side view showing an embodiment of the motor in accordance with the present invention;

Fig. 2 is a bottom view of the motor shown in Fig. 1;

Fig. 3 is a front view of the motor shown in Fig. 1;

Fig. 4 is a rear view of the motor shown in Fig. 1;

Fig. 5 is a perspective view showing a terminal employed in the motor of the present invention; and

Fig. 6 is a side view showing a conventional motor.

5 **Best Mode for Carrying Out the Invention**

In the following, a preferred embodiment of the motor in accordance with the present invention will be explained in detail with reference to the drawings.

As shown in Figs. 1 to 4, a motor 1 comprises a cored
10 motor, thereby attaining a smaller size. The motor 1
comprises a motor body A having a metal-made motor case
(barrel) 2 with a diameter of about 4 mm and a length of
about 10 mm. Secured to the inner wall face of the motor
case 2 is a stator made of a permanent magnet having N and
15 S poles. The motor case 2 contains therein a rotor comprising
an iron core wound with a coil. Secured to the center of
the rotor is an output shaft 3 supported with a bearing.
The output shaft 3 extends such that its leading end portion
penetrates through the front end portion of the motor case
2.
20

Secured to the rear end of the output shaft 3 is a
commutator with which a pair of brushes are slidably in contact.
Secured to each brush is a planar contact 4, whereas the
rear end of each contact 4 projects from a bracket 5 secured
25 to the rear end of the motor case 2. Also, a weight 6 having
substantially a semicylindrical form is cramped onto or

press-fitted into the leading end portion of the output shaft 3, so as to be eccentrically secured to the output shaft 3. As the eccentrically secured weight 6 rotates along with the rotation of the output shaft 3, the motor case 2 can be vibrated. Such a weight-equipped motor 1 is utilized for notifying a user of incoming calls in a pager, a cellular phone, or the like.

Here, the motor body A is provided with two terminals 8 for allowing the contacts 4 and their corresponding predetermined electric contacts in a circuit board 7 to electrically connect with each other upon a single motion. The terminals 8 are used for applying a predetermined external voltage to the brushes, and are disposed so as to correspond to their respective contacts 4. The base end of each terminal 8 is secured to its corresponding contact 4 with solder S. The terminal 8 is formed from a thin spring sheet, whereby the terminal 8 itself is provided with elasticity.

The terminal 8 is formed by bending a thin spring. As shown in Figs. 1 and 5, the terminal 8 has an attachment 10 to be secured to its corresponding contact 4 of the motor body A with the solder S, whereas the attachment 10 radially extends along an end face of the bracket 5. Further, the terminal 8 has a first portion 11 bent inward (toward the weight 6) at right angles at the lower end of the attachment 10. The first portion 11 extends substantially parallel to the output shaft 3 along the peripheral face of the motor

case 2.

Also, the terminal 8 has a second portion 12 which extends substantially parallel to the first portion 11 by way of a bent part B at which the front end of the first portion 11 is bent into a U-shape. The second portion 12 extends up to about a half of the first portion 11. The terminal 8 has a third portion 13 which is bent so as to project outward from the rear end of the second portion 12. Further, the rear end of the third portion 13 is formed with a curved part 13a having a top area formed with a grounding portion 14 whose surface is plated with Au. The grounding portion 14 ensures electric connection between the terminal 8 and its corresponding predetermined electric contact in the circuit board 7. Employing the terminal 8 thus formed by bending a spring sheet enables the terminal to be formed with a simple structure at a low cost, whereby the cost of manufacture would eventually be cut down.

Also, the terminal 8 is contained in a slit 17a of a leg 17 disposed near the rear end of the motor case 2 (see Fig. 2). Here, the third portion 13 of the terminal 8 is exposed from the slit 17a. As a consequence, without exposing the whole terminal 8, which is likely to be damaged, the part necessary for electric junction can be inspected visually, whereby the motor 1 can easily be assembled into other instruments.

Due to the foregoing configuration, the terminal 8 has

a resilient force in a direction substantially orthogonal to the output shaft 3, while the grounding portion 14 of the terminal 8 is disposed on the motor case 2 (barrel) side of the motor body A near the rear end thereof.

5 Consequently, as shown in Fig. 1, such an assembling operation is possible in which, while the motor 1 is disposed on the circuit board 7 and held in this state, a lid of an unshown instrument or the like presses the motor 1 from thereabove in the direction of arrow 2. In this case, the
10 terminal 8 elastically deforms as indicated by the dash-double-dot line in Fig. 1, so as to be pressed against the circuit board 7, whereby the grounding portion 14 of the terminal 8 and its corresponding electric contact are reliably connected to each other.

15 Also, when the motor 1 is placed on the circuit board 7 upon assembling the motor 1 into an instrument such as a cellular phone, the terminal 8 deforms, due to the weight of motor 1 and the weight 6, such that the third portion 13 approaches the first portion 11. Thus, if the grounding
20 portion 14 of the terminal 8 is disposed near the rear end of the motor body A so as to face the output shaft 3, the supporting balance of the motor 1 on the circuit board 7 can be made better, whereby the stability of the motor 1 becomes quite favorable. Also, from the viewpoint of keeping
25 the rotational balance of the output shaft 3 itself, which rotates at a high speed in front of the motor 1, it is quite

meaningful to dispose the grounding portion 14 of the terminal 8 near the rear end of the motor body A.

On the other hand, the motor body A is covered with a rubber-made holder 16 as indicated by the dash-double-dot lines in Figs. 2 and 3. Consequently, when the motor 1 vibrates along with the rotation of the weight 6, unnecessary vibrating sounds would not occur from the housing of the instrument. Here, the third portion 13 of the terminal 8 is exposed to the outside by way of a slit-like groove 16a formed in the holder 16.

Since the motor in accordance with the present invention is configured as in the foregoing, it attains effects as follows. Namely, since the motor comprises a motor body, an output shaft projecting from a front end of the motor body, and a voltage-supplying terminal provided in the motor body, whereas the terminal has an elastic force in a direction substantially orthogonal to the output shaft and also has a grounding portion disposed near a rear end of the motor body, the motor can stably be mounted on a circuit board when being assembled into an instrument.

Industrial Applicability

From the invention thus described, it will be obvious that the invention may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended

for inclusion within the scope of the following claims.

CLAIMS

1. A motor comprising:

a motor body;

an output shaft projecting from a front end of said
5 motor body; and

a voltage-supplying terminal provided in said motor
body;

said terminal having an elastic force in a direction
substantially orthogonal to said output shaft and also having
10 a grounding portion disposed near a rear end of said motor
body.

2. A motor according to claim 1, wherein said
terminal is formed by bending an elastic material, said
terminal comprising:

15 a first portion extending substantially parallel to
said output shaft from said motor body;

a second portion extending substantially parallel to
said first portion from a front end of said first portion
by way of a bent part; and

20 a third portion, formed with said grounding portion,
projecting outward in a curved manner from a rear end of
said second portion.

3. A motor according to claim 1, further comprising
a weight eccentrically secured to said output shaft.

25

ABSTRACT

The present invention aims at providing a motor which can stably be mounted on a circuit board when being assembled into an instrument in particular. The motor 1 in accordance with the present invention comprises a motor body A, an output shaft 3 projecting from a front end of the motor body A, and a voltage-supplying terminal 8 provided in the motor body A, the terminal 8 having an elastic force in a direction substantially orthogonal to the output shaft 3 and also having a grounding portion 14 disposed near a rear end of the motor body A.

Fig.1

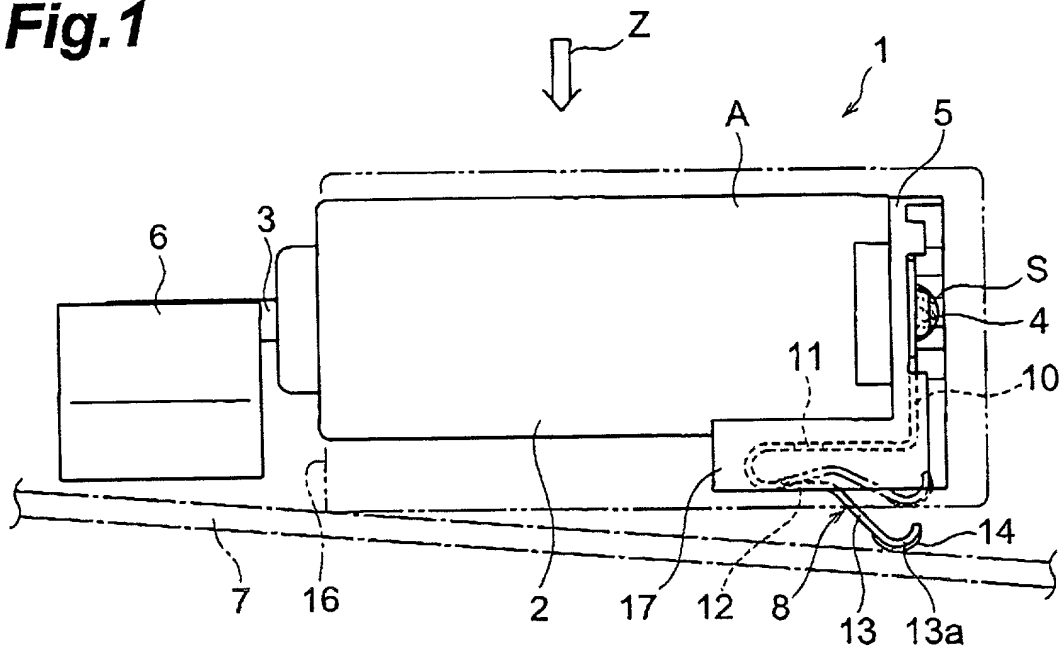


Fig.2

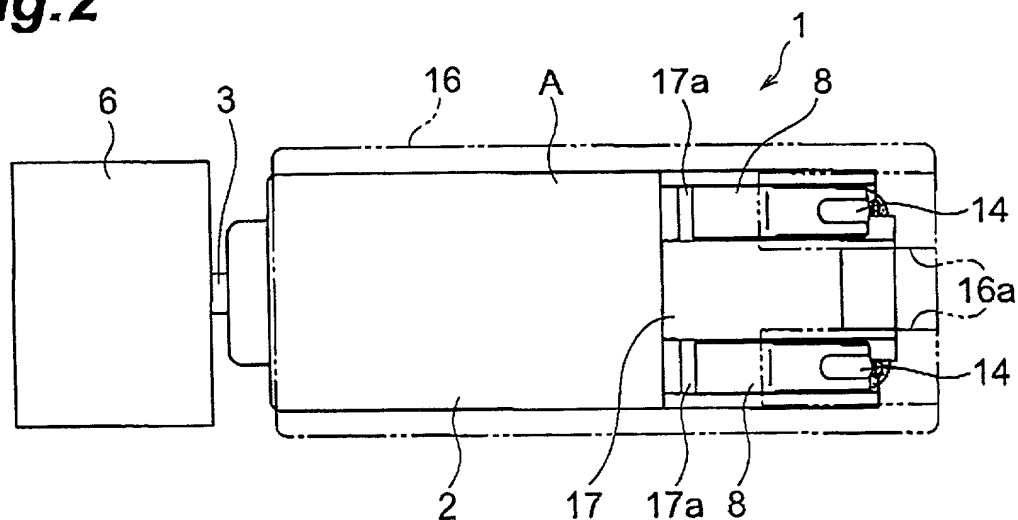


Fig.3

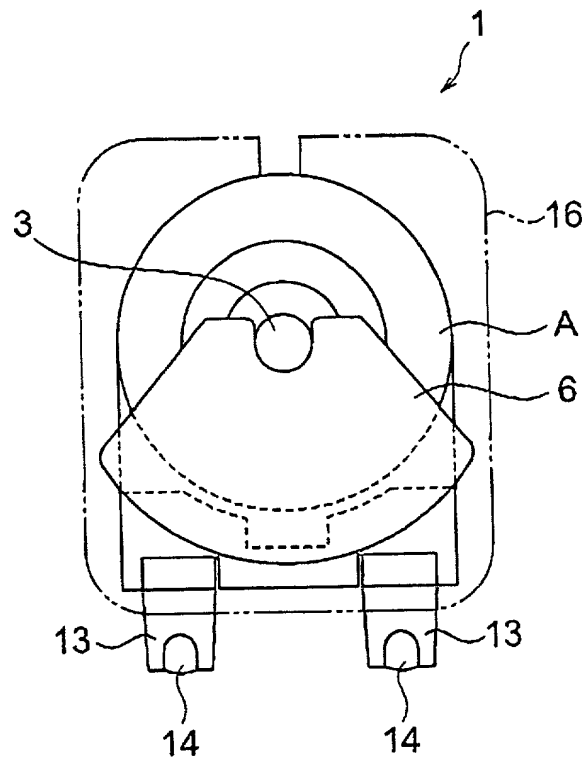


Fig.4

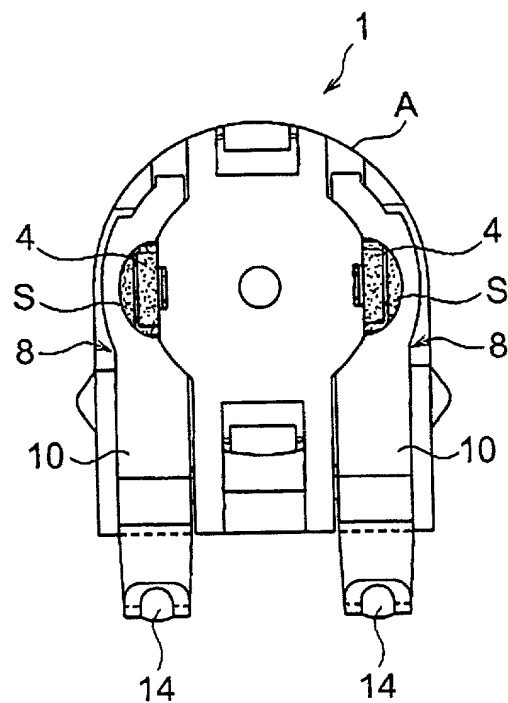


Fig.5

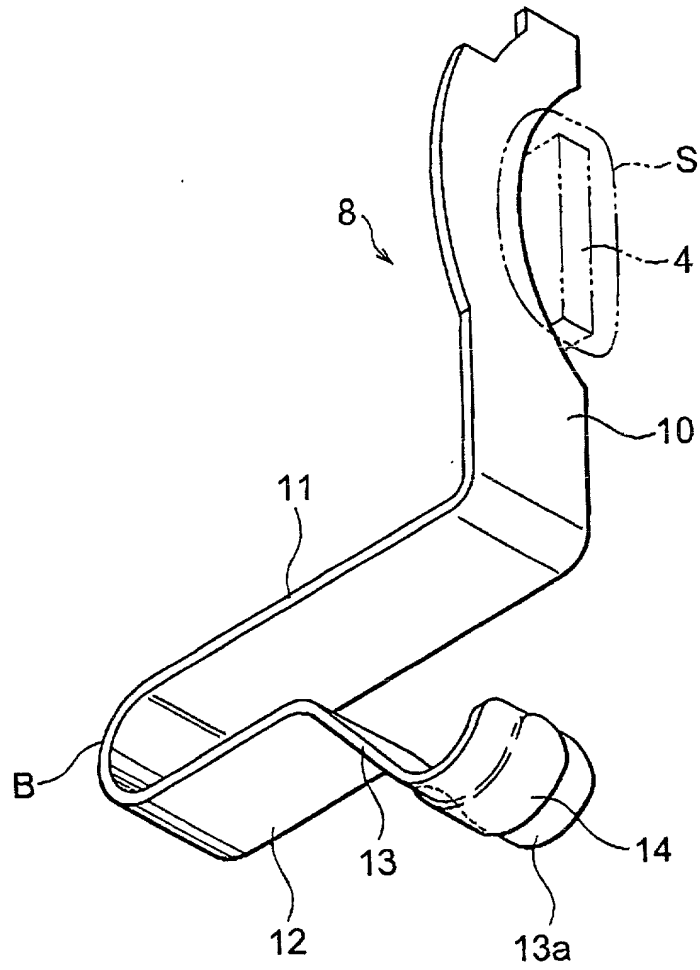
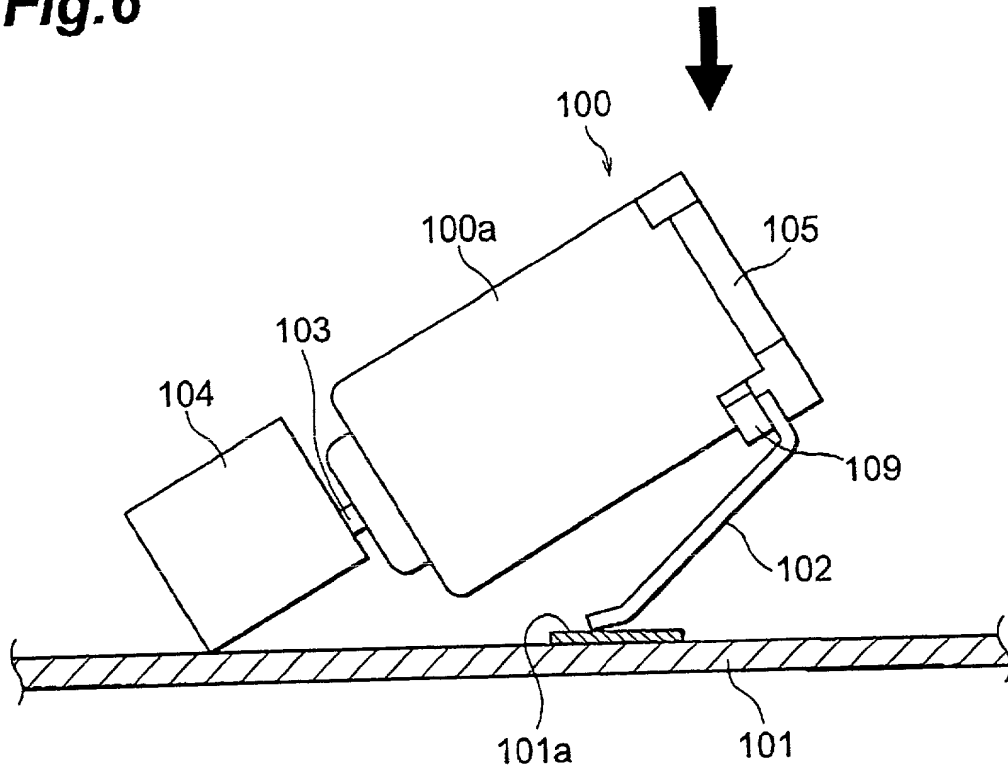


Fig.6

BEYER WEAVER & THOM

Attorney's Docket No. STP1P045

Combined Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

This declaration is of the following type:

☐ original ☐ supplemental

☒ national stage of PCT

☐ divisional ☐ continuation ☐ continuation-in-part

My residence, post office address and citizenship are as stated next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

MOTOR

the specification of which

☐ is attached hereto.

☐ was filed on _____
as United States Application Serial Number _____ and,
was amended on _____ (if applicable).

☒ was filed on July 24, 2000
as PCT International Application Number PCT/JP00/04926 and,
was amended under PCT Article 19 on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority under Title 35, United States Code, Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATIONS, BENEFIT CLAIMED UNDER 35 USC §119(a)

Application Number	Country	Date of Filing (Day/Month/Year)	Priority Claimed Under 35 USC 119
<u>P1999-209184</u>	<u>Japan</u>	<u>23 / July / 1999</u>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
_____	_____	_____	<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

PRIOR U.S. PROVISIONAL APPLICATIONS, BENEFIT CLAIMED UNDER 35 USC §119(e)

_____ (Application No.)	_____ (Filing Date)	_____ (Application No.)	_____ (Filing Date)
_____ (Application No.)	_____ (Filing Date)	_____ (Application No.)	_____ (Filing Date)

I hereby claim the benefit of Title 35, United States Code Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS
DESIGNATING THE U.S., BENEFIT CLAIMED UNDER 35 USC §120

PCT/JP00/04926 _____ (Application No.)	July 24, 2000 _____ (Filing Date)	Pending _____ (Status: Patented, Pending, Abandoned)
_____ (Application No.)	_____ (Filing Date)	_____ (Status: Patented, Pending, Abandoned)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the registered practitioners of BEYER WEAVER & THOMAS, LLP included in the Customer Number provided below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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